Reply to: "Treatment effects of fixed functional appliances in patients with Class II malocclusion: A systematic review and meta-analysis"

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Treatment effects of fixed functional appliances in patients with Class II malocclusion: A systematic review and meta-analysis

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Running title - Fixed functional appliances in Class II treatment

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Dear Sir,

We thank Drs Devi, Srinivasan, and Padmanabhan for their interest on our recently published systematic review (1) and their nice words. The points raised by our colleagues deserve some clarifications, which are presented below on a point-by-point basis.

As far as the first issue is concerned, our systematic review was based on treatment-induced skeletal, dental, and soft tissue changes measured through cephalometric variables. Although both angular and linear measurements were deemed initially as interesting to be assessed, we decided to focus our review's protocol solely on angular measurements, as synthesis of linear measurements is prone to bias due to magnification differences among studies (2, 3), which varied among the existing studies from 6 to 10 per cent. The most prudent approach would be to adjust the pre- and post-treatment results of each study according to its magnification factor (4)—as is done for example by Thurman et al. (5)—in order to enable metaanalysis. However, this kind of correction was not feasible, due to the incomplete reporting of the majority of existing studies, in which the exact magnification factor was not reported. We fully agree that it would be quite interesting to also assess the treatment effects of functional appliances through linear skeletal measurements; however, this was impossible at the present time, without imposing additional bias to our evidence base, which could distort the results. Should the reporting of magnification factors be improved in future studies, we would be more than happy to include linear measurements in the first update of our systematic review.

Further, the validity of angular measurements assessing the antero-posterior jaw relationships and their appropriateness for treatment planning and evaluation has long been discussed. It is generally agreed that the Wits appraisal (6) is helpful in complementing angular measurements like the SNA, SNB, and ANB angle, especially in high angle cases (7).

However, Wits appraisal is a linear measurement and thus, based on the review's protocol, it could not be included in our systematic review for the abovementioned reasons.

Finally, regarding the last query of our colleagues, we did indeed assess the overall effectiveness of various fixed functional appliances, including rigid, semi-rigid, and flexible appliances. Additionally, we tried to explore possible sources of heterogeneity and assessed possible differences in the treatment effects of the various appliances through mixed-effects subgroup analyses, which were specified a priori at the protocol stage, and took into account heterogeneity within- and across each appliance subgroup (Table 6). According to stratification by appliance, considerable differences exist among the identified appliances as far as the effect of functional treatment on the SNB, ANB, NA-APg, and 1i-ML angles is concerned (P among subgroups < 0.01). Under the prism of these results, it seems that considerable differences exist in the treatment effects of these appliances. However, additional evidence is needed to robustly support the credibility of these claims and reduce the existing uncertainty of these explorative analyses.

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